

In re Patent Application of:

**MEARS**

Serial No. **not yet assigned**

Filed: **herewith**

Attorney Docket: **62601\_CON1**

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**IN THE CLAIMS:**

Please cancel Claims 1 to 71.

Please add new Claims 72 to 97.

72. (new) A semiconductor device comprising:  
a superlattice comprising a plurality of stacked  
groups of layers;  
each group of layers of said superlattice comprising  
a plurality of stacked base semiconductor monolayers defining  
a base semiconductor portion and an energy band-modifying  
layer thereon;  
said groups of layers arranged in an alternating  
pattern of first and second groups of layers, with each first  
group of layers comprising three base semiconductor  
monolayers, and each second group of layers comprising five  
base semiconductor monolayers;  
said energy-band modifying layer comprising at least  
one non-semiconductor monolayer constrained within a crystal  
lattice of adjacent base semiconductor portions.

73. (new) A semiconductor device according to Claim  
72 wherein said superlattice has a common energy band  
structure therein.

74. (new) A semiconductor device according to Claim  
72 wherein said superlattice has a higher charge carrier

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mobility in at least one direction than would otherwise be present.

75. (new) A semiconductor device according to Claim 74 wherein the higher charge carrier mobility results from a lower conductivity effective mass for the charge carriers in a parallel direction than would otherwise be present.

76. (new) A semiconductor device according to Claim 75 wherein the lower conductivity effective mass is less than two-thirds the conductivity effective mass that would otherwise occur.

77. (new) A semiconductor device according to Claim 74 the charge carriers having the higher mobility comprise at least one of electrons and holes.

78. (new) A semiconductor device according to Claim 72 wherein each base semiconductor portion comprises silicon.

79. (new) A semiconductor device according to Claim 72 wherein each energy band-modifying layer comprises oxygen.

80. (new) A semiconductor device according to Claim 72 wherein each energy band-modifying layer is a single monolayer thick.

81. (new) A semiconductor device according to Claim 72 wherein said superlattice further comprises a base

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semiconductor cap layer on an uppermost group of layers.

82. (new) A semiconductor device according to Claim 72 wherein each non-semiconductor monolayer is thermally stable through deposition of a next layer.

83. (new) A semiconductor device according to Claim 72 wherein each base semiconductor portion comprises a base semiconductor selected from the group consisting of Group IV semiconductors, Group III-V semiconductors, and Group II-VI semiconductors.

84. (new) A semiconductor device according to Claim 72 wherein each energy band-modifying layer comprises a non-semiconductor selected from the group consisting of oxygen, nitrogen, fluorine, and carbon-oxygen.

85. (new) A semiconductor device according to Claim 72 further comprising a substrate adjacent said superlattice.

86. (new) A semiconductor device according to Claim 72 wherein said superlattice further comprises at least one type of conductivity dopant therein.

87. (new) A semiconductor device according to Claim 72 wherein said superlattice defines a channel of a transistor.

88. (new) A semiconductor device comprising:

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a superlattice comprising a plurality of stacked groups of layers;

each group of layers of said superlattice comprising a plurality of stacked base silicon monolayers defining a base silicon portion and an energy band-modifying layer thereon;

said groups of layers arranged in an alternating pattern of first and second groups of layers, with each first group of layers comprising three base silicon monolayers, and each second group of layers comprising five base silicon monolayers;

said energy-band modifying layer comprising at least one oxygen monolayer constrained within a crystal lattice of adjacent base silicon portions.

89. (new) A semiconductor device according to Claim 88 wherein said superlattice has a common energy band structure therein.

90. (new) A semiconductor device according to Claim 88 wherein said superlattice has a higher charge carrier mobility in at least one direction than would otherwise be present.

91. (new) A semiconductor device according to Claim 90 wherein the higher charge carrier mobility results from a lower conductivity effective mass for the charge carriers in a parallel direction than would otherwise be present.

92. (new) A semiconductor device according to Claim

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90 the charge carriers having the higher mobility comprise at least one of electrons and holes.

93. (new) A semiconductor device according to Claim 88 wherein wherein each at least one energy band-modifying oxygen monolayer is a single oxygen monolayer thick.

94. (new) A semiconductor device according to Claim 88 wherein said superlattice further comprises a base semiconductor cap layer on an uppermost group of layers.

95. (new) A semiconductor device according to Claim 88 further comprising a substrate adjacent said superlattice.

96. (new) A semiconductor device according to Claim 88 wherein said superlattice further comprises at least one type of conductivity dopant therein.

97. (new) A semiconductor device according to Claim 88 wherein said superlattice defines a channel of a transistor.